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Corporate Reporting on Sustainability Performance: A New Challenge and a Learning Process

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Introduction

More and more companies in the nuclear industry are openly committed to the achievement of sustainable development and engaged in the process of extended reporting on their performances, encompassing the economic, social and environmental dimensions of sustainability. This process requires a renewed look at company activities and management systems, a thorough commitment from the top to the bottom of the organisation and the elaboration of adequate performance indicators to monitor progress. Some lessons learnt and questions are developed hereafter out of the still limited experience of the AREVA group in this domain.

What is the meaning of sustainable development for an industrial company?

The concept of sustainable development originally addresses macroeconomics and country policy, since the core idea is to satisfy the needs of the present generation without impairing the capacity of the future generations to satisfy their own needs: in other words, our generation benefits from a given natural and human capital and we should build social, industrial and technical systems that will produce social welfare without destroying the capital which will also be necessary to our successors. Such a broad and systemic concept encompasses many dimensions, generally summarised by the "three bottom lines" categories: economic growth, environmental protection and social development.

The translation of such a broad concept to the "micro level" of a company is not straightforward. It raises generic questions:

- Since the company is only a link in a social and economic chain, does the chain as a whole contribute to sustainable development? For instance, what is the overall effect (economic, social, environmental) of electricity generation and consumption?
- Does the company itself, through its industrial activity, do its best to satisfy the present generation, identified as various stakeholders: customers, shareholders, employees, and neighbours…?

- Does the company itself, through its industrial activity, do its best to preserve the environment in the long run?
- If the company now satisfies the stakeholders, is it sustainable? Will the company maintain the ability to sustain that satisfaction? In other words, is the financial position sufficiently strong? Is the human capital of the company maintained and renewed at a high enough level?

Company commitment to sustainable development means commitment to total performance. The challenge is that it is often difficult to make progress in all directions (economic, social, environmental) simultaneously. Trade-offs between different stakeholders may be required. Then, decisions have to be justified on the basis of well-established priorities. Moreover, the company is not free to establish the hierarchy of priorities; it cannot ignore the demand from each stakeholder. Then the risk might be to drift from one wind to the other… To keep sustainable development manageable at the level of the company, several prerequisites can be identified:

- The company will identify the most pertinent progress criteria, which should be well related to the company production process and at the same time respond to the expectations of the stakeholders. The company will clearly announce on which targets efforts will be concentrated, on a permanent basis.
- To monitor the continuous progress with transparency, a system of measurement is required: quantified indicators have to be defined whenever possible.
- Total performance implies total commitment of the workforce ("cultural dimension") and total integration of the sustainable development objectives into the existing management system.

What is the meaning of sustainable development for a <u>nuclear</u> industry company?

Some particular points should be emphasized for a nuclear company:

- Whatever the position of the company in the nuclear energy chain (power generation, fuel procurement, services, equipment, etc…), it contributes to a power generation chain which carries out specific sustainability attributes, such as affordable price of electricity, accessible uranium resources, negligible greenhouse gas emission, low health impacts, high social standards. The higher the share of nuclear energy in the energy mix of any country, the better for sustainable energy policy.
- From the beginning, the nuclear industry has been accountable on many aspects since it was submitted to very strict regulations and control. Social responsibility belongs to our culture: let us only consider the long practice of safety, quality assurance, health protection, discharge monitoring and control, safeguards against proliferation.
- Nevertheless, the nuclear industry is often suspected of hiding many bad features and it is regarded as essentially unsustainable by a number of actors.

Confidence building is at stake in reporting our performances and clearly we need some specific indicators.

The case of AREVA

The 10 principles of action

AREVA`s commitment to sustainable development is expressed and articulated along 10 business principles which cover all the issues associated with our activities:

1) Governance
2) Financial performance
3) Customers' satisfaction
4) Social partnership
5) Dialogue and consultation with stakeholders
6) Safety and technological risk management
7) Environment protection
8) Innovation
9) Territorial integration
10) Continuous improvement

AREVA responsibility and sustainability are addressed by the principles 1, 2, 6, 7, 8, 10.
Stakeholders' expectations are addressed by the principles 2, 3, 4, 5, 6,7, 9.

This list of principles governs the plan of implementation at all levels: corporate, business units, plants, teams, and individuals. It governs also the contents of reporting to AREVA's stakeholders. Progress should be decided, planned and measurable along each of the 10 principles.

The case of AREVA

Management: a deeply rooted approach

For effective implementation, the SD policy should be embedded in the company management practices, requiring no extra management system.

Organisation

One central idea of the new organisation is to embrace the corporate functions of safety, security and health, environment, quality, local economic development under the same umbrella of "Sustainable Development and Continuous Improvement" (SDCI). Another idea is to establish a network of correspondents within each corporate department and to keep in each of the subsidiaries a director in charge of SDCI, reporting to the AREVA Vice President for SDCI :

- The Corporate Department for Sustainable Development and Continuous Improvement is leading the definition, the implementation and the monitoring of AREVA SD policy.

- Every month, the advancement of implementation plans is reviewed by the AREVA Committee for SD, involving the SD Director from each first rank subsidiary company (COGEMA, FRAMATOME ANP, FCI, TECHNICATOME), the correspondents of the corporate central departments, the director of the General Inspectorate for Safety and the coordinators for security and health, for environment and for continuous improvement.

- The programme is deployed and implemented through a network of correspondents in every Business Unit and every facility.

Management and procedures

In the nuclear industry, many management systems and procedures are in place and already contribute to the management system required for the implementation of sustainable policy:

- Quality Assurance programmes set up since 1975. ISO 9001 standard is the minimum certification level for most of the AREVA units.

- The critical self-assessment exercise patterned after the European Foundation for Quality Management model (EFQM).

- Quality management by “work processes”.

- Environmental management systems meeting the ISO 14001 standard.

- Nuclear safety procedures associated with the culture of risk management.

- Radiation protection monitoring and control.

- Safeguards (nuclear material accountancy, physical protection).

- Reporting to authorities and to third parties (Local Commissions of Information).

To integrate all these practices and to put them in line with AREVA SD, a specific internal reference book of continuous objectives and good practices, called *AREVA Way*, has been designed. It will guide the practice in every operating unit and corporate department according to the 10 AREVA principles of action. The system involves indicators monitoring the advancement of policy implementation along each of the three axes (economic, social, environmental).

AREVA`s current objectives are:

- In 2003, to apply the *AREVA Way* to 6 test operating units.
- Before the end of 2005, to extend the ISO 14001 certification to all the facilities implying significant environmental risks (65% of the nuclear sites are already certified).

- Before the end of 2006, to set up an environmental management system in 100% of the sites.

The case of AREVA

Performance indicators

In 2002, AREVA initiated the elaboration of performance indicators, using national and international models as reference. The investigations were guided by three goals:

- To quantify the group's total performance.
- To define objectives that could be shared by all the group operations.
- To report to stakeholders on performance and progress.

In 2003, a subset of indicators is presented in the first sustainable development report.

In the future, indicators will be phased in gradually, accompanied by active dialogue with stakeholders and by independent third-party verification of a certain number of them.

The selected indicators are listed in *Tables 1, 2, 3.*

*Table 1***:** Environmental indicators (1) Resource Consumption

Water from underground water table	m^3
Surface water	m^3
Tap water	m^3
Heavy fuel	MWh
Light fuel and gasoline	MWh
Electricity	MWh
Thermal energy	MWh
Gas	MWh
Copper and copper alloys	t
Plastics	t
Lead	t
Nitric acid 100% (HNO3)	t
Sulphuric acid 100% (H2SO4)	t
Tributylphosphate (TBP)	t
Hydrofluoric acid 100% (HF)	t
Ammonia 100% (NH3)	t
Chlorine (Cl2)	t
Chlorinated solvents	t

Table 2: Environmental indicators (2) Emissions and waste

GHG direct emissions	T eqCO_2
GHG indirect emissions	T eqCO_2
Volatile Organic Compounds (VOC)	t
Atmospheric SO2	t
Atmospheric NH3	t
Atmospheric HF	t
Atmospheric HCl	t
Atmospheric NO2	t
Atmospheric CFC	t
Halon	t
HCFC	t
Aquatic total N	t
Aquatic Copper	kg
Aquatic Zinc	kg
Aquatic Tin	kg
Aquatic Chromium	kg
Aquatic Lead	kg
Aquatic Cadmium	kg
Aquatic Mercury	kg
Aquatic Uranium	kg
Conventional hazardous waste	t
Conventional non-hazardous waste	t
Radwaste (LLW, ILW) to surface repository	m^3
Radiological impact of La Hague reprocessing plant	mSv

Table 3: Social indicators

Total manpower	Number
Average worker's exposure to radiation (*)	mSv
Number of employees less than 2 mSv	Number
Number of employees 2 – 3.99 mSv	Number
Number of employees 4 – 5.99 mSv	Number
Number of employees 6 – 7.99 mSv	Number
Number of employees 8 – 9.99 mSv	Number
Number of employees 10 – 11.99 mSv	Number
Number of employees 12 – 13.99 mSv	Number
Number of employees 14 – 15.99 mSv	Number
Number of employees 16 – 17.99 mSv	Number
Number of employees 18 – 19.99 mSv	Number
Number employees more than 20 mSv	Number
Rate of absence	No.days off/ theoretical nb working days
Accident frequency	No.accidents with inability/million

	worked hours
Accident severity	No.lost days/thousand worked hours
Number of incidents level 0 (INES scale)	Number
Number of incidents level 1 (INES scale)	Number
Number of incidents level > 1 (INES scale)	Number
%age employees benefiting from one training	%
%age women among the executive officers	%
%age women among the executives	%
%age women among the other employees	%
%age impaired persons	%

The case of AREVA

A. Sampled actions and performances

Social Partnership: building a shared culture

On 11 February 2002, AREVA's management and the leading labour organisations signed a collective bargaining agreement for major aspects of the group's French labour policy. Specific agreements are already in place on the role and resources allocated to labour coordinators and the organisation of collective bargaining entities in France. Negotiations scheduled for 2003 will focus on the establishment of a European Committee for the group and on defining principles for mobility and reclassification.

Productivity gains and changes in workload at some of the sites have prompted staff cutback measures, including manpower reduction plans but also voluntary early retirement programmes. Nine of the companies signed early retirement programmes with 1283 qualified personnel for departures in the 2003 to 2005 time frame. Local resource adaptation is also facilitated by mobility within the group, encouraged by a dedicated training budget.

Employee mobility is an excellent way to share experience, globalise personnel, and develop management skills. A number of tools and programmes to promote mobility within the group were deployed. A mobility committee composed of human resources managers from throughout the group meets every month to review and facilitate employee mobility.

AREVA brings together entities with their own backgrounds, cultures, businesses and technologies. Shared values and a sense of enterprise will make the bone and sinew of the group. In 2002, AREVA embarked on a participatory process to identify and formulate core values. A professional ethicist was appointed.

Programmes were implemented to foster interactions and the sharing of experience, to increase knowledge of the group's operations and business strategy and to strengthen the sense of belonging to a major international industrial group.

- Inaugurated in 2002, "AREVA University" is helping to develop a shared management model and core values. It will also capitalise on the group`s scientific and technological expertise. Managerial development will address five key priorities: strategic vision, customer focus, globalisation, financial knowledge, and sharing knowledge and practices.

- The first "AREVA Management Days" held in November 2002, were attended by two hundred executives and about a hundred future managers.

- The TEAM AREVA project capitalised on the sponsorship of the boat "DEFI AREVA" for the America's Cup in 2003. By establishing a network of coordinators in the 185 entities, the operation played a key role in structuring internal communications. Numerous communication tools and local initiatives were developed around the operation.

B. Occupational safety and health

Radiation protection of personnel is driven according to the ALARA principle in all AREVA facilities. Both the number of exposed individuals and the level of individual exposures are maintained as low as possible. Personnel dose monitoring is implemented under the control of national authorities, such as DGSNR in France, NRC in the USA and BFS in Germany. The same dose monitoring process is applied to the workers of subcontractors operating on AREVA sites.

Measured exposures are reported in *Figure 1*. The regulatory limit for occupational exposure is 20 mSv/year in the European Union and 50 mSv/year in Niger where COGEMA is a mine operator. The objective now is to suppress any dose higher than 20 mSv/year in all AREVA group facilities.

C. Environmental performance

The principle of action here is to minimise the environmental impact of AREVA activities by:

- reduction of natural resource consumption,
- permanent control of discharges,
- optimal waste management.

As to energy consumption by the AREVA plants, it amounted to 19 424 GWh in 2002, 95% of it in the form of electricity. The main consumer is the gas diffusion process of EURODIF, which accounts for 90% of the total. The rest of the plants consumed 2433 GWh, equivalent to an European town of 400 000 inhabitants. At the end of EURODIF plant life, the gas diffusion process will be replaced by the centrifugation process, which consumes 20 times less energy.

Energy consumption is associated with GHG emissions. The assessment of GHG emissions from AREVA operations (*cf. Table 4***)** has been evaluated by rigorous Life Cycle Analysis. It includes direct emissions from the stacks (i.e. carbon dioxide from fuel, gasoline, natural gas… plus other GHGs) and indirect emissions related to electricity consumption, accounting for the power generation emissions. In France, however, only 10% of electricity is generated from fossil fuels reducing the ratio of GHG emission per kWh. The total GHG emissions from AREVA represent less than 1% of the avoided GHG emissions linked to the use of the nuclear fuel provided by AREVA.

Table 4: GHG emissions from AREVA operations in 2002

(in tonnes of CO_2 equivalent**)**

	Direct emissions	**Indirect emissions (from electricity consumption)**
Nuclear front-end operations	272 000	286 000
Nuclear services to NPPs	18 000	12 000
Nuclear back-end operations	122 000	47 000
Connectics manufacture	11 000	147 000
TOTAL	**423 000**	**492 000**

The main source of radioactive discharges in AREVA group operations is the La Hague reprocessing plant, for which a steady programme of actions has led to very low residual impacts. Currently, the individual annual exposure due to the plant discharges is not higher than 0.010 mSv for the most exposed neighbours, which is about 200 times less than exposure to natural radiation. Additional actions are still planned to guarantee the impact level at less than 0.030 mSv/year whatever the annual programme of plant operation in the future.

Reporting on radioactive discharges and on their effective impact raises a difficult question:

1. Authorisations are delivered as maximum discharges, measured as becquerels per year, for specified radionuclides. Effective annual discharges are reported by the operator to the Authority and communicated to the Local Commission of Information. Regulatory procedures of sampling and measurement are well defined, to monitor the discharges. But a long list of discharged radionuclides gives no idea of the overall impact. Moreover, if the discharge goes up for one radionuclide and down for another, the resulting net effect cannot be qualified.

2. Going one step further, the Authority requires and controls an extensive programme of sampling and measurement in the terrestrial and marine environment. There, concentrations (in Bq/kg or Bq/m^3) are determined for each radionuclide. A comparison is possible between the concentration level of discharged radionuclides (added radioactivity) and the concentration of pre-

existing radionuclides (background radioactivity). But since the radiotoxicity of different radionuclides can differ by several orders of magnitude (*cf. Table 5*), such a comparison cannot give a reliable appraisal of the impact.

3. The only way to evaluate the impact is to assess the exposure of individuals to the discharged radionuclides, adding all the pathways of exposure: by external radiation, by ingestion, by inhalation, taking into account the specific biological effect of each radionuclide. Then we get the total effective dose to the individual (in mSv/year). This exposure can be compared to the regulatory limit (1 mSv/year for the public in the European Union) and also to the exposure to the background radioactivity. But the problem here is that no regulatory model is available to calculate the mass transfer of radionuclides through the environment to individuals. Since such models involve complex phenomena and uncertainties, controversy is possible. As of today, authorisations and regulatory monitoring cannot be based on individual exposure, even though it is the pertinent indicator.

4. The case of La Hague impact was subject to persistent controversy, until the French government decided in 1997 to commission a working group of experts from all concerned parties (industry, research, authorities, NGOs…): le "Groupe Radioécologie Nord Cotentin". One of the main outcomes of the group`s work was the consensus on the method and model to calculate the impacts of discharges to the atmosphere, to the sea and to rivers.

For that reason, AREVA is in a position to report the annual impact of the La Hague plant, without risk of controversy on the value. Moreover, AREVA has been able to pledge to maintain the impact of discharges lower than 0.030 mSv/year at La Hague. But this agreement is limited to La Hague, since the model is site specific. The same effort of dialogue, countercheck, and validation is now necessary for the other sites. AREVA has set the objective to extend not later than in 2005 the harmonisation of the impact assessment model to the main sites of the Group.

Table 5: Compared toxicity of different radionuclides

Radio nuclide	***Tritium***	***Ru-106***	***Cs-137***	***I-129***	***Pu-239***	***Po-210***
Toxicity per ingestion (microSv/Bq)	0.000018	0.007	0.013	0.12	0.25	1.2
Impact for marine release of 1 GBq/year at La Hague (microSv/year)	10^{-9}	10^{-4}	$0.7\ 10^{-4}$	$4\ 10^{-4}$	$70\ 10^{-4}$	

The question of waste management is closely related to the general concept of sustainable development: as long as the waste volumes are limited and the waste packages efficient enough to confine the pollutants inside, which is the case of nuclear waste packages, waste has no impact on the present generation; but it is difficult to persuade and guarantee that it will have no impact in the very long term. Waste management optimisation means efforts at all steps of the waste

lifecycle: minimal generated quantity, most efficient conditioning, safe transportation and safe disposal. But optimising raises other questions:

1. Priorities have to be set as to what should be minimised: volumes, contained toxicity, probability of failure?

2. Optimisation involves at least three levels of action:

- The policy level: e.g. spent-fuel reprocessing or not.
- The process development level: e.g. selecting concrete or bitumen as the containment matrix, developing waste compaction.
- The operation and maintenance level: plant operation can be oriented towards waste minimisation.

For some waste categories, the company can achieve and report annual progress at the third level: AREVA has decided to report the annual volume of low and intermediate level waste that is delivered to the ANDRA surface repository. AREVA is also considering the objective of a 10% volume reduction of conditioned radwaste that is delivered to a regulated repository.

The company can also sometimes develop new processes or improve operated processes. (Second level). In 2002, AREVA started the new compaction ACC plant in La Hague, which is dedicated to the improved conditioning of hulls and head-ends and of some operating waste.

The company cannot change by itself the national waste policy.

For those reasons, company commitment on more indicators related to waste management still requires some elaboration. However, it should be emphasized that information is given on other aspects of waste management, such as the quantities stored on site in each installation and the quantities belonging to foreign customers currently stored at La Hague to be returned overseas.

Innovation

In 2002, a budget of €332 million (4.2% of turnover) was dedicated by AREVA to R&D. AREVA capacity for innovation is based on long-term partnerships with French institutions like Commissariat à l'Energie Atomique, the waste agency ANDRA, the safety expertise institute IRSN, but also with research laboratories from several other countries. AREVA`s future performance and sustainability will depend on the development of advanced technologies, anticipating our customers' needs and aiming at improved competitiveness. The major axes of R&D are listed in *Table 6.*

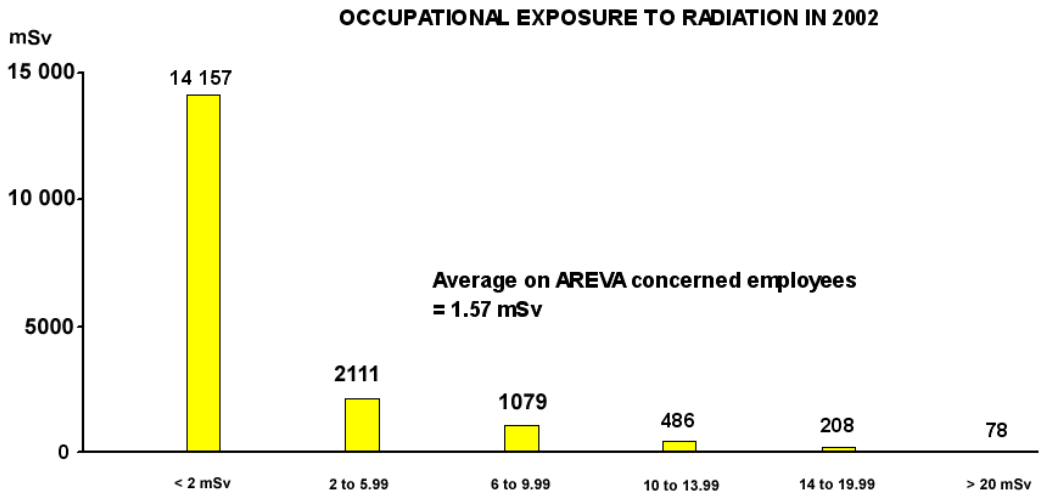
Table 6: R&D priorities

R&D target	***Expected outcome***
Improved nuclear fuel performances	Increased reliability, safety Fuel savings Waste minimisation
Extended reactor lifetime	Increased safety Higher return on investment
New reactor generations	Increased energy efficiency New applications (hydrogen)
Optimised waste management	Minimised long-term toxicity and volume
Improved environmental performances of processes and plants	Reduced discharges to the environment Cleaning and Dismantling of installations New processes for site remediation
Reinforced protection of workers and neighbouring populations	Minimised radiation exposure
Increased connectors performance	Reliability Connection speed Down-scaling
Improved connector manufacture process performance	Competitiveness Replacement of toxic materials

Conclusion

AREVA group is employing more than 50 000 persons in a variety of industrial sectors: mining, fuel cycle services, services to nuclear power plants, nuclear engineering, connectors, etc. Plants are located in many countries throughout the world, embedded in different cultures, complying with different regulatory systems and industrial standards. The implementation of a sustainable development policy of this scale requires a good compromise between common objectives and management tools on one side, and flexibility and site-specific implementation on the other side. Performance indicators have to be carefully selected to cover all the significant components of commitments. Answers have to be provided to all our stakeholders. The first Sustainable Development report is a first trial, hopefully fraught with no major error, but obviously calling for improvements in the next sequence. This is the case of some nuclear-specific performance indicators, which could be usefully elaborated and discussed within the framework of the WNA dedicated working group in order to avoid confusing conceptual or wording discrepancies from one company to another.

Figure 1:


OCCUPATIONAL EXPOSURE TO RADIATION IN 2002
mSv
15 000
10 000
5000
0
14 157
2111
1079
486
208
78
Average on AREVA concerned employees
= 1.57 mSv
< 2 mSv
2 to 5.99
6 to 9.99
10 to 13.99
14 to 19.99
> 20 mSv